

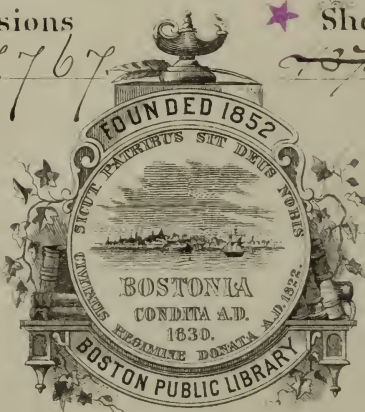
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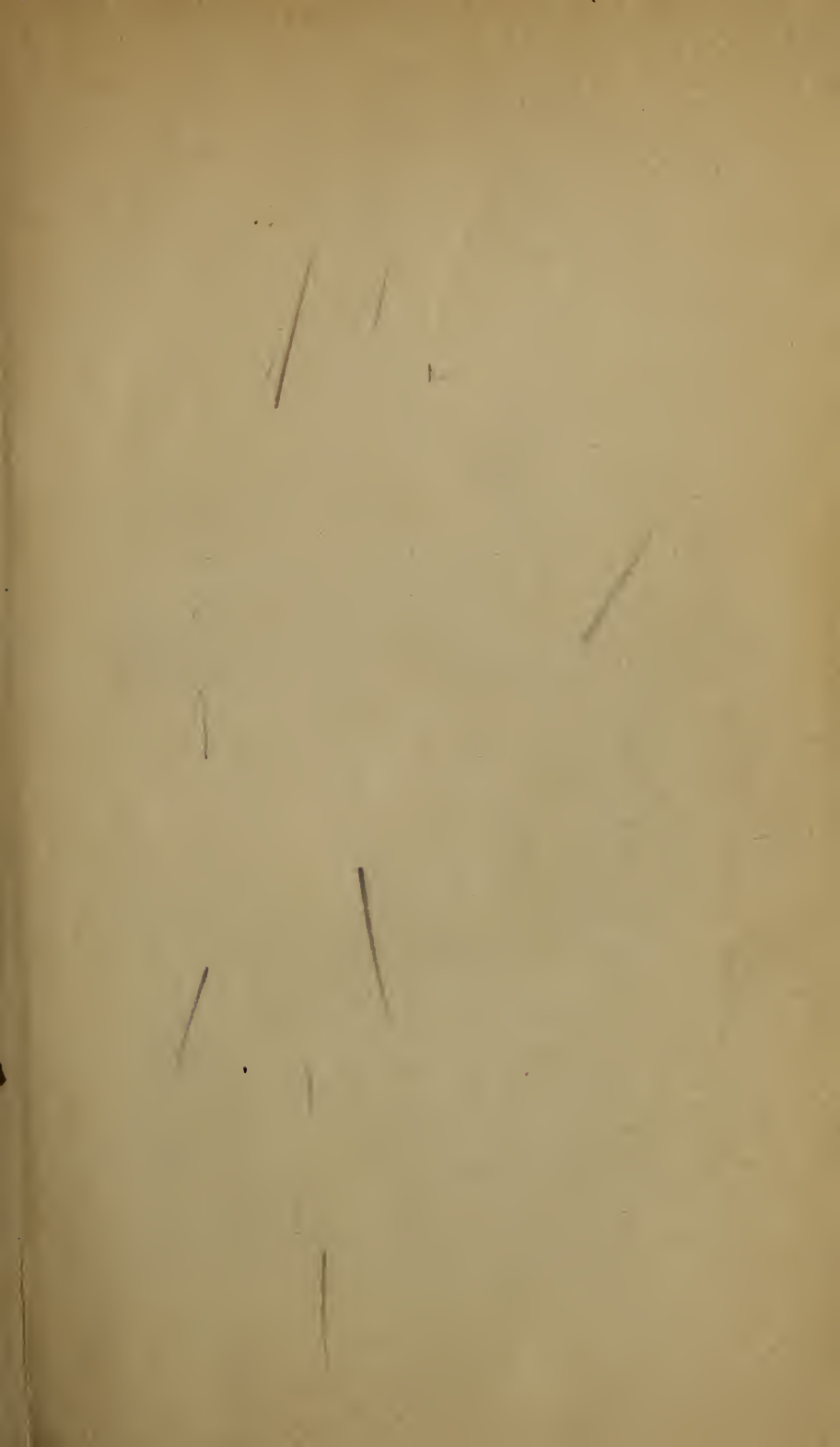
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Received Jan. 3, 1885.



Letter of the State Geologist

RELATIVE TO THE PROGRESS OF THE

STATE GEOLOGICAL SURVEY,

DURING

THE YEARS 1864-65.

LETTER.

SAN FRANCISCO, January 1, 1866.

To His Excellency, F. F. Low,
Governor of California:

SIR:—The Legislature, during the session of eighteen hundred and sixty-three and eighteen hundred and sixty-four, re-established the office of State Geologist, then about to expire by constitutional limitation, by passing the following Act:

“AN ACT

TO CREATE THE OFFICE OF STATE GEOLOGIST, AND TO DEFINE THE DUTIES THEREOF.

“The People of the State of California, represented in Senate and Assembly, do enact as follows:

“SECTION 1. J. D. Whitney is hereby appointed State Geologist. He shall be commissioned by the Governor, and it shall be his duty, with the aid of such assistants as he may appoint, to complete the geological survey of the State, and prepare a report of said survey for publication, and superintend the publication of the same. Such report shall be in the form of a geological, botanical, and zoological history of the State; and the number of copies of each volume to be printed, and the style, form, maps, diagrams, or illustrations to be contained therein, or to be printed separately, shall be determined by the State Geologist; and said report, when published, shall be sold upon such terms as the Governor and Secretary of State may decide upon, and the proceeds of such sales shall be paid into the Common School Fund of the State.

“SEC. 2. It is hereby made the duty of the State Geologist and his assistants to devote the time not necessarily required in the preparation and superintendence for publication of the reports provided for in section one of this Act, to a thorough and scientific examination of the gold, silver, and copper producing districts of this State, and to such scientific and practical experiments as will be of value in the discovery of mines and the working and reduction of ores.

"SEC. 3. The following sums of money are hereby appropriated, out of any money in the State Treasury not otherwise appropriated, for the prosecution of the geological survey of the State, and for the sixteenth and seventeenth fiscal years: For salary of the State Geologist, nine thousand dollars, to be drawn monthly on the last day of each month; for salary of two assistants, six thousand six hundred dollars, to be drawn in the same manner as the salary of the State Geologist; for publication of two volumes of report, six thousand dollars; for office rent, and expenses of survey in mining districts, and experiments on ores, and all incidental expenses of work, ten thousand dollars, to be drawn one half each fiscal year.

"SEC. 4. This Act shall take effect immediately."

The above Act was approved by the Governor, April fourth, eighteen hundred and sixty-four.

Previous to the passage of this Act the following sums had been appropriated for the continuance of the survey:

| | |
|---|----------|
| At the time of the passage of the original Act..... | \$20,000 |
| By the Legislature of 1860-61..... | 15,000 |
| By the Legislature of 1861-62..... | 15,000 |
| By the Legislature of 1862-63..... | 20,000 |
| Making in all..... | \$70,000 |

Besides this, three thousand dollars was appropriated by the Legislature of eighteen hundred and sixty-one and sixty-two for printing one volume of the report.

At the time the Legislature of eighteen hundred and sixty-three and sixty-four met the new Constitution of the State was in operation, and the sessions being now biennial, instead of annual, it was necessary to provide funds for continuing the survey for two years. Unfortunately the State was at this time in great trouble, the drought of the two previous winters having most seriously affected both the agricultural and mining interests, and given rise to a widespread feeling of alarm. It was therefore with difficulty that any appropriation could be secured for the survey, and that which was obtained was far from being adequate to the carrying on of the work on a scale commensurate with its importance. Indeed, it was but just enough to keep the survey alive, in addition to continuing the preparation of the materials already in hand for publication. The appropriations for the survey in the Act cited above, added to those of previous Legislatures, make the total amount provided for the fieldwork and salaries in all departments, from the commencement of the survey up to June thirtieth, eighteen hundred and sixty-six, ninety five thousand six hundred dollars, or a little less than sixteen thousand dollars a year on the average. Besides this, however, there has been nine thousand dollars appropriated for publication, which should not be charged to the survey, as this amount will be refunded to the State by the sale of the volumes published, it being provided in both Acts that our publications shall be sold and the money paid into the Common School Fund.

The course and progress of the geological and topographical fieldwork

of the survey, up to the end of the year eighteen hundred and sixty-three, has already been made known in the letters addressed to the Governor from year to year. A resumé of the movements of the various parties will also be found in the preface of the first volume of the geology of the report.

In the summer of eighteen hundred and sixty-four, a small party was fitted out to commence the exploration of the Sierra Nevada, it being my intention to work up the geology and topography of that great chain, from the south towards the north, as accurately as our time and means would allow. This party consisted of Messrs. Brewer and Hoffman, accompanied by Messrs. King and Gardner, volunteer assistants in the geological and topographical departments. They took the field in May, and proceeded across the plains of the San Joaquin to Visalia, from which point they entered the Sierra, ascending King's River to its source, and exploring the whole region about the headwaters of that and Kern River. Thence they made their way across the range by a pass over twelve thousand feet high, passed up Owen's Valley, ascended the west branch of Owen's River, crossing the Sierra again at an altitude of twelve thousand four hundred feet, and thence descending to the head of the San Joaquin River. The exploration was continued through the region of the headwaters of that stream and the Merced, connecting the reconnoissance with that of eighteen hundred and sixty-three around the sources of the Tuolumne. The whole expedition occupied about three months, during which time the geography and geology of a district including an area of over ten thousand square miles were for the first time explored, the whole region having previously been entirely unknown. The results prove to be of the greatest interest, disclosing the fact that this was the highest part of the Sierra Nevada, and that it embraced the loftiest mountains and the grandest scenery yet discovered within the territory of the United States. For the details of this reconnoissance reference may be made to Chapter X of Volume I of the Geology, which has just been published by the survey.

At the close of this campaign Professor Brewer relinquished his position on the survey, and left California to enter on his duties as Professor in the Sheffield Scientific School of Yale College. He still remains, however, charged with the direction of the botanical department of the survey, as will be noticed further on, under the head of botany.

Messrs. King and Gardner continued their explorations northward of the field of their labor during the summer, by making a survey and map of the Yosemite Valley, under authority of the Commissioners appointed to take charge of the tracts embracing that valley and the Big Tree Grove of Mariposa County, recently conveyed to the State of California by the United States.

In the spring of eighteen hundred and sixty-four, Mr. King had commenced the detailed exploration of the principal metalliferous belt of the Sierra Nevada, by examining the geology of the Mariposa estate and its vicinity. This work was continued by Mr. Rémond in the summer of eighteen hundred and sixty-five, and carried from the Merced to the Stanislaus River, a careful geological and geographical map of that region having been furnished by him as the result of his labors. In addition to this he visited and examined seventy-seven gold mines, besides many other localities of other metals, and sixty-six quartz mills, of which twenty-three were in operation. This work, which is the continuation of that done in the Sierra during the previous year, forms the first contribution to our detailed exploration of the mining districts of

California; this exploration we expect to continue as soon as it is in our power to take the field again in the Sierra.

In the meantime, Mr. Gabb has left for the southern part of the State, to make a thorough examination of portions of the Coast Ranges, where the occurrence of bituminous matter in large quantity has, especially during the last twelve months, been exciting much attention.

The above is all the geological fieldwork which it has been in our power to undertake, with the extremely limited appropriation made by the last Legislature, a portion of which had necessarily to be used in the preparation of the "Geological, Botanical, and Zoological History of the State," provided for in the Act under which we are now at work. What progress has been made in the preparation of our results for publication, in conformity with the Act, will now be stated under the appropriate heads.

I.—TOPOGRAPHY.

In addition to the maps previously described as forming a portion of the results of our topographical work, we have commenced a new one, which embraces the most valuable and important part of the State, and covers the area on which, as near as can be ascertained, somewhat over nine tenths of the population are now residing. This map extends from the parallel of thirty-six degrees and thirty minutes to that of forty degrees and thirty minutes, and from the one hundred and eighteenth to the one hundred and twenty-third meridian, thus including the whole Sierra from Owen's Lake north, to Lassen's Peak, the Coast Ranges from Point Sur and New Idria on the south, to Clear Lake on the north. It also includes the western portion of Nevada. The scale of this map is six miles to the inch, and its size four and a half feet square, so that it can be engraved to four sheets. On this all the topographical work of the survey has been compiled, together with such materials of an authentic character as could be obtained from other sources, especially from the offices of the United States Surveyor-General, and the United States Coast Survey. The work of Mr. Wackenreuder in the high Sierra, which was continued for a short time during the summer of eighteen hundred and sixty-four, forms an important portion of the new material incorporated in our map of Central California. The drawing of this map is considerably advanced, and has been executed by Mr. Hoffman, the topographer of the survey, in the most creditable manner; if ever completed, it will not only form a highly important contribution to the geography of the State, but will be of great practical value. A considerable amount of fieldwork, however, remains to be done in the region which it covers. The extreme northwestern portion, including the region north of Clear Lake, has never been even approximately mapped, and portions of the Sierra, especially the region between the Mono and the Silver Mountain Passes, and that north of the Henness Pass, have never been instrumentally surveyed.

The "map of the region adjacent to the Bay of San Francisco," and that of the vicinity of Mont Diablo, are ready to be placed in the engraver's hands, and the last named one will be photolithographed as soon as an establishment for doing this kind of work by the "Osborne process" is set in operation in this country, Mr. Osborne being at present in Boston for this purpose. Some difficulty has been met with in finding an artist who could be trusted to do justice to the bay map; but the close of the war and the contraction of the currency will, it is to be presumed, relieve our engravers on copper and steel from a large portion of the

calls which have for the last four years been made upon them, and it is probable that this map will be put in hand immediately.

The preparation of a map of the whole State, on a scale of six miles to the inch, was formerly contemplated; but of later years we have considered that this was an undertaking of too extensive a character to meet with encouragement from the Legislature. Should the survey be continued for three or four years longer, we should be able to furnish a general map of California on a scale of ten or twelve miles to the inch, which would far surpass in value and accuracy anything now existing. Still, many years must elapse before correct maps of the almost unknown southeastern and northwestern corners of the State will be had. It is certain that the United States Land Office surveys of the southern part of the State do not give any idea of its topography, and it is difficult to understand how the town and section lines can have been run there, and so little idea of the topography obtained; while the extremely rough and mountainous character of Del Norte, Humboldt, and Trinity Counties, now to a large extent in possession of hostile and warlike Indians, will render it difficult to execute any detailed geological or geographical work in that region, for a long time to come.

II.—PHYSICAL GEOGRAPHY.

Our materials in this department are constantly accumulating; but we have not yet begun to arrange them for publication. The barometrical measurements of mountains have been continued, and instruments have been carried to greater heights than ever before were attained within the limits of the United States. We await with much interest the elaborate report of Colonel R. S. Williamson, of the United States Engineers, to the Topographical Bureau, on the subject of the laws governing the fluctuations of the barometer on the Pacific coast. This work will be of great importance to science, and of especial value to us, as enabling us to use our own observations more intelligently than would be possible unless we had the means of carrying on a series of investigations similar to those of Colonel Williamson, and on which a large amount of time and labor would have to be expended. The subject of the distribution of the forest vegetation of the State will occupy a chapter in our volume of Physical Geography, and it is hoped that we shall be able to illustrate it with a map showing the range of the different groups of species.

III.—GENERAL GEOLOGY AND PALÆONTOLOGY.

The volume just issued, which is entitled "Geology—Volume I; a report of progress and synopsis of the fieldwork from 1860 to 1864," will be a sufficient exhibit of our progress in the investigation of the geological structure of the State.

It is to this department of general geology that up to the present time by far the greater portion of our attention has been given, since the first thing required in a geological survey is a knowledge of the general geological structure of the State, the age of the various formations which occur in it, and their range and extent, or the position which they occupy on the surface, and their relations to each other. Each group of strata, thus determined by its lithological peculiarities, and by the fossils which it contains, is then to be laid down upon the map in the position which its outcrop occupies on the surface. The general

character of the minerals and ores which occur in each formation or group of strata having been first determined, the details of their mode of occurrence, their relative abundance, and the facilities which may exist in each separate district for making them economically available, must, after the preliminary general work has been done, be the object of more special and detailed examinations. It is not, however, the business of a geological surveying corps to act to any considerable extent as a prospecting party; to do this would require that we should confine our operations to a very limited area. The labor of the whole corps for an entire season would not suffice to thoroughly prospect more than a few hundred square miles in a very rich mineral region, and we should often have to engage in expensive mining operations to decide what was really of permanent value. It is our task, rather, to limit the field of research, and to show to others where their labor will be best bestowed, preventing foolish expenditure of time and money in searching for what our general geological investigations have determined not to exist in sufficient quantity in certain formations to be worth working. Especially in the first years of our work in a State of such immense area as California, our labors must have more the character of a geological reconnoissance than of a detailed survey.

In the department of palæontology one volume has already been published. This contains, in the first section, a description of the carboniferous fossils of Bass' Ranch, the only locality where any well preserved organic remains of that age have been found within the State. The second section is devoted to the fossils of the triassic rocks, including all which have thus far been discovered in California and on its borders. While we have abundant evidence that a formation equivalent in geological age to the Alpine trias, or the beds of Hallstadt and St. Cassian, occurs over a vast area, and forms an important part of the metalliferous belt of the Pacific coast, and probably on both sides of the Sierra, and while fossils of this age have been found at several localities within the borders of California, our most ample supply of well preserved specimens has come from the Humboldt mining district in Nevada. Hence we have included in our descriptions of the triassic fossils those of that region, although some among them have not yet been found in California.

The third section of the volume of palæontology is devoted to the jurassic fossils of the Sierra Nevada, or, rather, to such as had been discovered at the time of its publication. These fossils are all from the localities near Genessee Valley, noticed in section eleven, Chapter IX of Volume I, of the Geology. At the end of that volume a few pages will be found containing descriptions of the jurassic fossils of the auriferous slates in Mariposa County, from the localities discovered by Mr. King, and in close proximity to one of the great quartz veins of the mining region proper. This paper, by Mr. Meek, and which is illustrated by a steel plate, was published in the geological volume to prevent delay, as the question of the geological age of the auriferous slates is one of great interest, and some time will necessarily elapse before the second volume of the palæontology will be ready for publication. In the meantime, and during the past year, Mr. Rémond has traced the belt of fossiliferous jurassic rocks from the Merced River to the Stanislaus, finding several genera and species different from those previously obtained from this formation. These, together with such other fossils of this age as may hereafter be discovered in the State, will be described and published in the second volume of the palæontology.

The fourth section of the volume in question is devoted to the creta-

ceous fossils, and forms considerably the larger portion of it, as the rocks of this age occupy a very extensive area on the Pacific coast, and are rich in fossils at many localities. A reference to the section in question will show how large an amount of material, new to science, has been derived from the rocks of the cretaceous series, of the existence of which on this coast previous to the commencement of our work but little was definitely known.

The first and third sections of the palæontological volume were prepared by Mr. Meek; the second and fourth by Mr. Gabb. The plates are thirty-two in number, partly engraved on steel, and partly on stone, from drawings furnished by the authors of the text. The volume is printed and bound in a very superior manner, and is sold at three dollars and fifty cents per volume, (in cloth,) as determined by yourself and the Secretary of State, which is about the cost of the mechanical execution of the edition. The text is stereotyped, and one thousand copies have been printed, and bound in various styles. A statement of the number of copies of each volume of the publications of the survey which have been sold, and of the number remaining on hand, will be furnished to the Treasurer of State at the close of each fiscal year; and, at the same time, the money received from the sales will be paid over to that officer, unless otherwise directed by the Legislature, to be placed by him in the Common School Fund of the State. The stereotype plates of the volume remain for the present in charge of the printer.

The first part of Section 1, Volume II, of the Palæontology, is in the hands of the printer. It contains the first portion of the descriptions of the tertiary invertebrate fossils, by Mr. Gabb, and will soon be in circulation. The plates to accompany this article, thirteen in number, are drawn, and will soon be put in hand. A considerable amount of new material from rocks of the cretaceous age is also on hand and partly prepared for the printer and engraver. The vertebrate fossils collected by the survey have been referred to Doctor J. Leidy for description. They will be worked up by him for the second volume of the Palæontology, and in the meantime a preliminary notice of them has been received, containing descriptions of several new species of the fossil horse, rhinoceros, and other large animals, and a catalogue of the whole collection, which comprises remains of the mastodon, elephant, tapir, bison, a reptile allied to the ichthyosaurus, crocodile, and other animals of great interest. The fossil plants of the survey will be worked up by Doctor Newberry, to whom portions of our materials in this department have already been referred. The diatoms and other microscopic forms have been submitted to Mr. A. M. Edwards, of New York. The fauna and flora of the tertiary rock, with the additional matter belonging to the lower formations, which has been and will be obtained before the close of our work, will furnish ample material for a second volume in the palæontological department.

IV.—ECONOMICAL GEOLOGY, MINING, AND METALLURGY.

In the geological volume just published, a considerable amount of information will be found in regard to the economical geology of the State; but all the detailed descriptions of mining regions and mining processes have been reserved for the volume or volumes specially devoted to these subjects. We have now arrived at a stage of the

survey when, the preliminary reconnoissance of the State being well advanced, we can take up the mining districts, work up the details of their geology, and investigate the quantity, quality, and mode of occurrence of their ores. We need, however, a laboratory, where the necessary chemical work of this and other branches of the survey can be done, under my immediate personal supervision.

Mr. Ashburner's investigations of the quartz mines and mills of the State were the commencement of work in this department, and, as far as they go, they form an important contribution to an understanding of the mining interests of California. The tabular statement, prepared by him to exhibit the principal facts connected with the auriferous quartz mills running in eighteen hundred and sixty-one, will always be valuable for reference. It has been printed in the appendix to the volume of geology, for convenient reference.

The work of investigating in detail the geology of the mining regions of the State has been begun, but will require a long time for its completion, so vast is the field and so important are the interests with which this branch of our work is connected. We can do much for the benefit of the people in this department if properly supported by the Legislature; but hasty and superficial work will be of little use. Too large a portion of the resources of California has already been thrown away in foolish mining enterprises, and although the career of reckless speculation may seem to be checked at present, yet the same scenes of wild excitement will be repeated again and again unless reliable information becomes widely disseminated among the people. It is fully time that a stop should be put to a course which has already materially retarded the progress of the State, and which, if persisted in, will bring utter financial ruin upon us.

V.—BOTANY.

The botanical department of the survey has been and still continues under the charge of Professor Brewer. From his investigations it appears that about one thousand six hundred species of flowering plants, (including the higher orders of the flowerless,) and over one hundred species of mosses, have been found growing naturally within the limits of the State or on its immediate borders. In the orders below the mosses in the scale of organization the data are still too imperfect to allow a probable estimate to be made of the number of species.

The collection made by the survey contain about seventy-four per cent of all the species known to exist in this State, and about five per cent of them are new to science, and eleven per cent new to the State—that is, not before found within its borders.

Professor Brewer is now engaged in preparing a report which will be in fact a "Manual of the Botany of California," containing as full descriptions of all the plants of the State as can be given in one volume. Of this the general plan and arrangement will be similar to those of the "Colonial Floras," issued under the auspices of the British Government. Full reference and synonyms will be given of all the species peculiar to the Pacific States, and which occur in California; and a chapter will be added on the general distribution of the plants of the State and their economical value. This volume will form a suitable text book to be used in the schools of the Pacific coast in connection with "Gray's Lessons in Botany" or some other elementary work of a similar character; and it may be added that this science cannot be taught in California until such a manual as the one proposed has been prepared, since the descriptions

of the plants of the State are at present scattered through hundreds of volumes, most of which are quite inaccessible to any except the very few who are furnished with costly and extensive botanical libraries.

In preparing this volume, a task in which considerable progress has been made by Professor Brewer, he will have the aid of several of the most eminent botanists of the country. Professor Gray, of Cambridge, has kindly offered to work up the large and difficult family of the *Compositæ*; he has also determined most of the species in the collection, and has given every facility for consulting the collections and library of the "Gray Herbarium," of Harvard University. Professor Torrey, of New York, will describe certain orders of the *Apetalæ*, of which he has made a special study. Dr. Englemann, of St. Louis, will prepare the description of the *Cactaceæ*, and render assistance in several other orders to which he has particularly devoted himself. Professor Thurber, of New York, will describe the grasses, and Professor Eaton, of New Haven, the ferns and higher cryptogamic plants. The carices collected during the first two years of the survey were examined and determined by Dr. Booth, of London, just before his death. The herbaria of Professor Torrey, so rich in Pacific coast specimens, and those of the Academy of Natural Sciences of Philadelphia, and of the Smithsonian Institution, have also been freely opened to Professor Brewer for comparison and consultation. The plants in the State collection will all be carefully named, and it is hoped that the Legislature will not much longer delay having them placed where they will be accessible for comparison to all students of this science on the Pacific coast.

It is believed that the botanical volume may be got ready for the press before the close of the year eighteen hundred and sixty-seven.

VI.—ZOOLOGY.

The extensive acquaintance of Doctor Cooper with the fauna of the Pacific coast, obtained previous to his connection with the Geological Survey, has enabled him to prepare a large amount of material for the press, forming the basis of at least four volumes of our report. The following table shows what had been accomplished in the way of zoological collecting up to April first, eighteen hundred and sixty-four, in six of the classes:

| | Mammals.... | Birds..... | Reptiles..... | Batrachians | Fishes | Mollusca..... |
|---|-------------|------------|---------------|-------------|--------------|---------------|
| Number of species known to exist in California..... | 110 | 353 | 66 | 18 | 183 | 542 |
| Collected by the survey | 34 | 237 | 33 | 10 | 74 | 507 |
| New to the fauna of California..... | 13 | 11 | 10 | 1 | 20 | 211 |
| Not before described..... | 2(?) | 4 | 4 | | 13 | 122 |
| Found east of the Mississippi | 23 | 161 | | 1(?) | 2(?) | 29 |

In some of the classes a considerably larger exhibit of species obtained for the collection could have been made, had it not been deemed advisable by Doctor Cooper not to collect the more common and easily procured species until a suitable place had been provided for the museum of the survey. The mounting of specimens of birds and mammals is so much more satisfactorily done from freshly prepared skins, that the collecting of such species as can be readily obtained in this vicinity may properly be deferred until they can be set up at once in the place they are destined to occupy. The number of specimens illustrating the zoology of the Pacific coast, now in the collection of the survey, may be estimated at between seven thousand and eight thousand.

Of three of the four volumes of the zoological reports the illustrations have been in hand for several months, and it is hoped that they will be so far advanced towards completion that at least two of them may go to press during the year eighteen hundred and sixty-six.

Two volumes of the zoological series will be devoted to the birds and mammals, and Doctor Cooper's manuscript will be carefully revised by Professor Baird, of the Smithsonian Institution, who also has charge, under my general direction, of the execution of the illustrations. We propose to give a figure of one species in each genus of the birds; those which have never before been described or figured being illustrated by large colored figures on steel or stone, and the others by wood cuts. The different species of each genus will be distinguished from each other by diagrams of the head, claws, wings, and other characteristic parts. The mammals will also be fully illustrated, the object being to furnish, in the zoological series, manuals or text books which shall not only have a permanent scientific value, as containing in a condensed and systematic form all that is known of the fauna of the State of California and its borders, but which shall also be practically useful to those persons who may desire to ascertain the names and habits of the animals they may meet with on land or in the waters of the Pacific coast.

The description of the fishes will form a separate volume, and this will be prepared by Mr. Theodore Gill, who will be able to use, not only the materials and notes furnished by Doctor Cooper, but also the extensive collection of the Smithsonian Institution, accumulated during many years of labor by the various naturalists who have devoted themselves to gathering specimens on the Pacific coast in this department. Each species will be illustrated by a carefully drawn and engraved figure, the work being done under Mr. Gills' immediate supervision.

The shells will also afford the material for another volume, Doctor Cooper's collections being very extensive, and comprising nearly two hundred new species. As the eminent conchologist, Mr. P. P. Carpenter, has been for a long time specially devoted to the study of the shells of the Pacific coast, Doctor Cooper's collections have been placed in his hands for study, and it is expected that he will prepare one of the volumes of our zoological series, in which each species will be illustrated by an accurate figure.

The maps and sections, with perhaps some of the more important illustrations of the scenery of the State, should be placed together in one volume or atlas, and this will form the proper conclusion of our series of publications.

According to our plans for publication, as developed in the preceding pages, it will be seen that we contemplate issuing from eleven to thirteen volumes, which are distributed among the different departments of the survey as follows:

| | |
|---|----------|
| Physical Geography..... | 1 |
| General Geology..... | 2 |
| Palæontology..... | 2 |
| Economical Geology, Mining, and Metallurgy..... | 1 or 2 |
| Botany..... | 1 |
| Zoology..... | 3 or 4 |
| Maps, sections, etc..... | 1 |
| Total..... | 11 to 13 |

Of these, two are already issued, and eight more are in a forward state of preparation, the illustrations of three of them being nearly all drawn, and a portion of them already engraved. The amount of time required to complete the series of thirteen volumes will, of course, depend upon the vigor with which the work is pushed, and that, again, on the amount appropriated by the Legislature. With a sufficiently liberal appropriation, it is probable that the fieldwork may be finished before the time expires when the office of State Geologist will by constitutional limitation cease to exist—April the fourth, eighteen hundred and sixty-eight. The completion of the printing and engraving will of course require a longer time; but it will perhaps be reasonable to estimate that within four years from the present time the full series of volumes may be in the hands of the public.

No provision has yet been made by the Legislature for the arrangement and exhibition of the collections made by the survey, as was contemplated in the original Act under which our work was commenced. These collections are already very extensive, embracing many thousand specimens of rocks, fossils, minerals, and ores, as well as the extremely important suites in the zoological and botanical departments. All these specimens are of great value, as illustrating the natural history, the geological structure, and the mineral resources of the State. Such of these as have not been required for use in the preparation of our report, remain packed in boxes and stored away at the office of the survey. Unfortunately, we were obliged, for want of room, to store a portion of our specimens in a (so-called) fireproof warehouse in San Francisco, and these have already been destroyed by fire, entailing a serious loss on the survey and the State. In view of this calamity, it will not be necessary for me to enlarge on the necessity of providing a permanent fireproof building for our collections, as has already been repeatedly urged by me in my annual communications to the Legislature. The only official step thus far taken by the Legislature towards the establishment of a State Museum, is the passage of the following resolution by the Legislature of eighteen hundred and sixty-two and eighteen hundred and sixty-three.

“*Resolved*, by the Assembly, the Senate concurring, That Professor J. D. Whitney, State Geologist, John Swett, State Superintendent of Public Instruction, and J. F. Houghton, Surveyor General, be and they are hereby constituted a Board of Commissioners, to report to the Legislature on or before the second Monday of December, one thousand eight hundred and sixty-three, upon the feasibility of establishing a State University, embracing an Agricultural College, a ‘School of Mines,’

and a Museum—including the geological collection of this State; and that said Board report such facts and considerations as they may deem important in connection therewith.”

In obedience to this requisition of the Legislature, an elaborate report was submitted by the Board of Commissioners as above constituted at the session of eighteen hundred and sixty-three and eighteen hundred and sixty-four. In this report the whole subject of the organization of a State University was thoroughly discussed, and the requirements of the Constitution in this respect duly set forth. The establishment of a State Polytechnic School, having for its object “the professional training of young men in the exact and natural sciences, and their application to arts, manufacture, mining, and agriculture,” was strongly recommended to the Legislature. It was also proposed that the collections of the geological survey should be placed in a suitable fireproof building, in which should be ample accommodations for displaying and showing them, as well as room for a library, laboratory, and an office for the survey, together with lecture rooms, and other conveniences necessary for a scientific school, for which purpose the building was to be used after the completion of the survey. This would have been the first step towards the establishment of a State University, provided for long since by the Constitution, and for which funds have been furnished by the United States.

The interest on the money received from the sales of the land given by Congress has thus far been applied to another purpose; but it is evident that the people, through the Legislature, are bound in honor to see that the trust accepted by the State and incorporated in their own Constitution should be sacredly complied with.

In concluding this communication, it may be mentioned that the Act under which the survey is at present conducted does not require the State Geologist to present to the Legislature, through the Governor, or in any other way, any annual report or estimate for the continuance of the survey, as was demanded by the Act under which the survey was originally organized. The State Geologist will, however, be happy to appear before the “Committees on Mines and Mining Interests” of the Senate and House, and to give them all possible information in regard to the progress of the survey, and what he deems desirable for continuing the work both in the field and in the office.

I am, with high respect, your obedient servant,

J. D. WHITNEY,
State Geologist.

